

Hard Rock Mining Training and Research Center

(HRMTRC) as part of the

National Underground Science Lab (NUSL)

Interested Collaborators (to date)

Proposer

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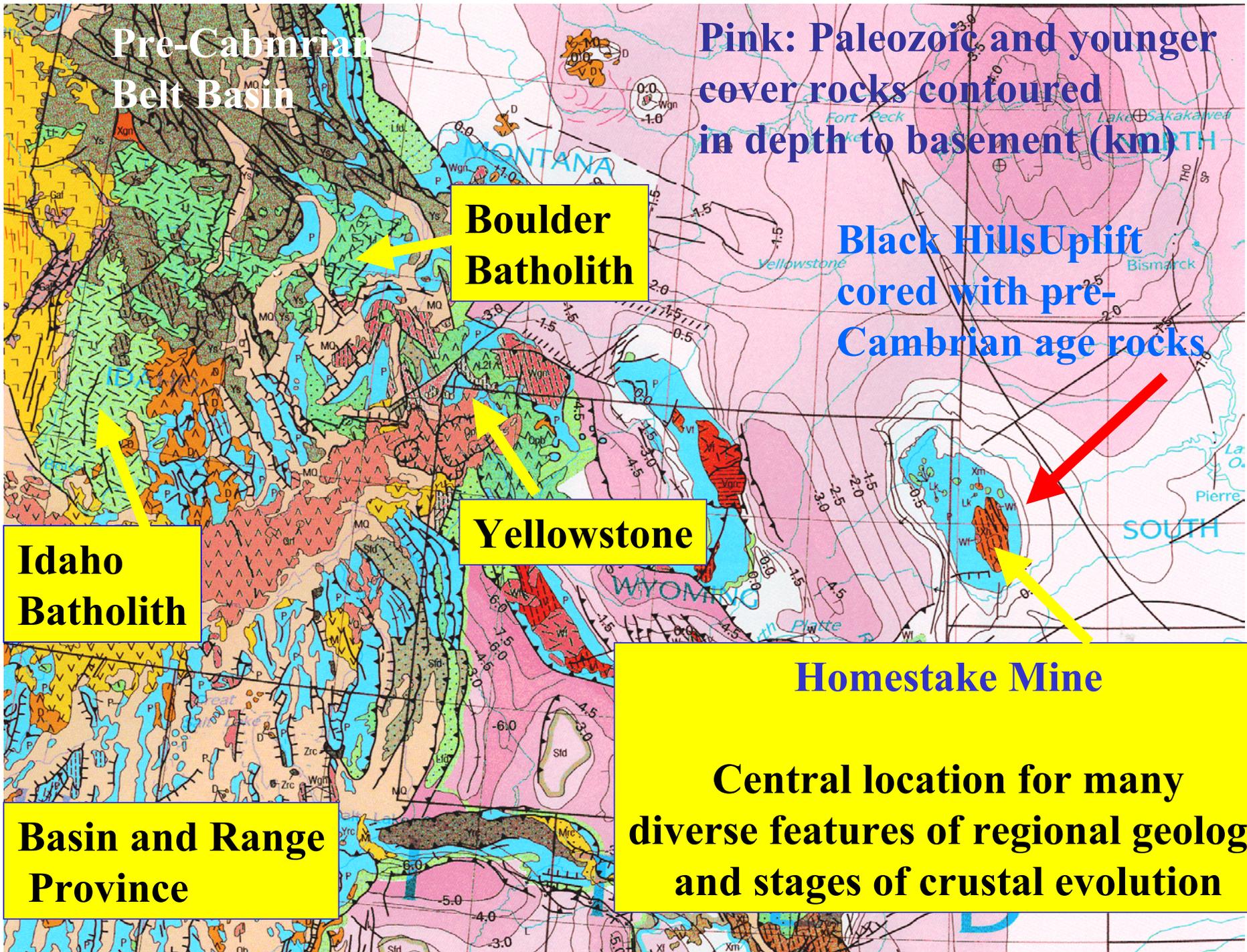
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**Pre-Cambrian
Belt Basin**

**Pink: Paleozoic and younger
cover rocks contoured
in depth to basement (km)**

**Boulder
Batholith**

**Black Hills Uplift
cored with pre-
Cambrian age rocks**

**Idaho
Batholith**

Yellowstone

**Basin and Range
Province**

Homestake Mine
**Central location for many
diverse features of regional geology
and stages of crustal evolution**

Motivation for a Centralized National Training and Research Center

Open mining is reaching its economic limit with depth and increased stripping ratio

More open pits mines are planning deep underground mines to extend mine life

Domestic hard rock mining work force is insufficient to meet this demand

Fewer schools are training mining geologists and engineers

A centralized national training and research center would meet this demand for miners and technical staff and provide a place for practical research and development work

Activities in the HRMTRC:

Development of basic underground mining skills:

Hard rock mining

Orientation, mining cycle, safety, equipment use and maintenance, ground support, stope retreat

Mining geology

Traditional and digital mine mapping, ore grade control, rock mass characterization, 3-D modeling, exploration drilling and logging, centralized data base management and interpretation

Mining engineering

Stope design, rock mechanics, production drilling, back fill, ventilation, transportation, robotics, production and optimization

Research and Development in the HRMTRC:

Hard rock mining

Experimentation in stoping and rock breaking,
accident reduction, productivity and mine safety optimization

Mining geology

Application of practical digital mine mapping methods
3-D computer modeling, creation of a full
3-D digital data base for the entire Homestake
Mine, computer analysis of structural data,
and *ore grade and recovery maximization*

Mining engineering

Experimental testing of advances in stoping
methods, long hole mining, bench mining
robotics, and *production optimization*

**Use of UC Berkeley Digital Mapping Lab
digital mapping technology and GeoMapper
software**

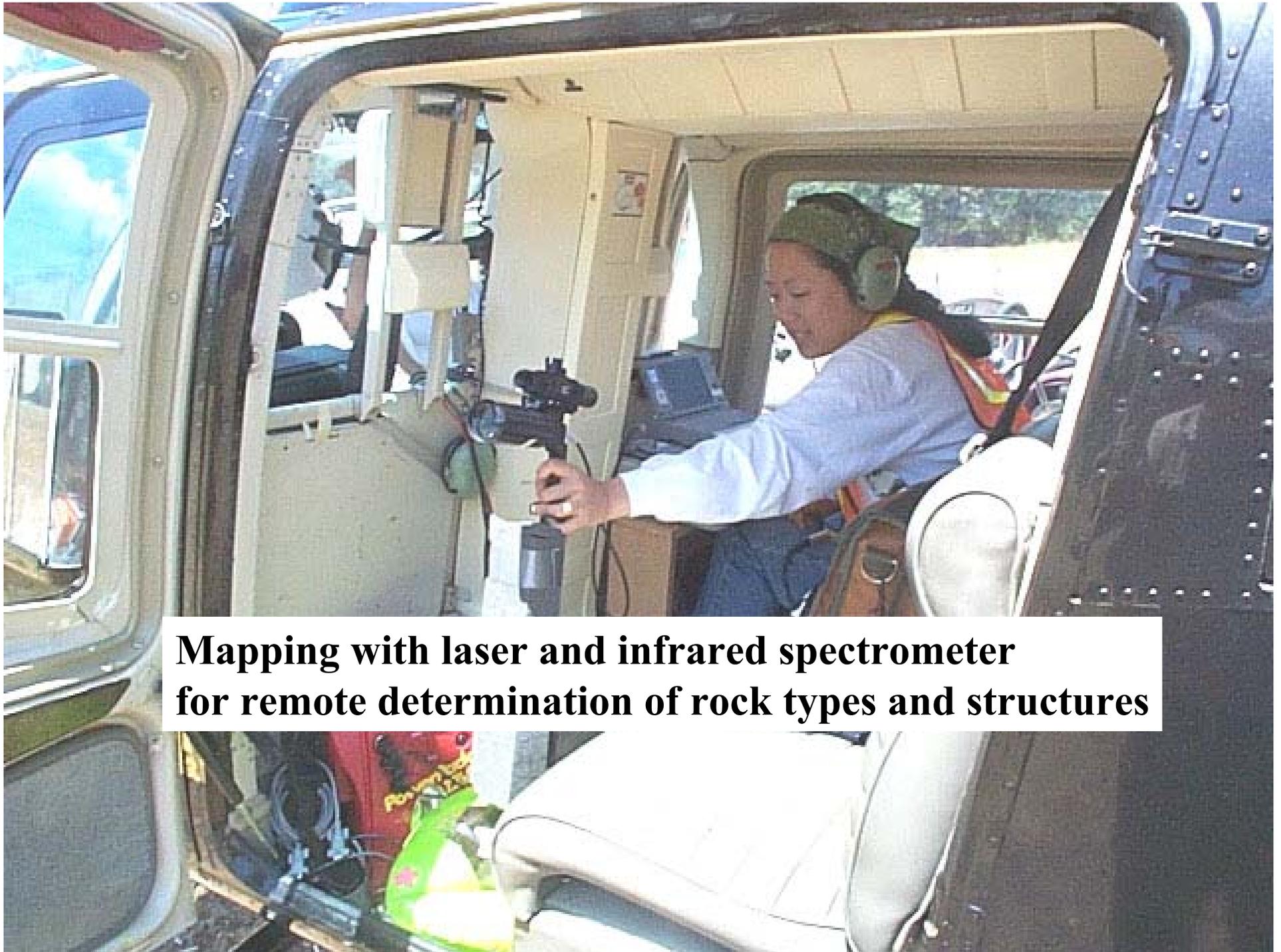
Mapping laser

**Pen computer
for direct geological mapping with wearable systems**





New mine geologists tool: real-time direct digital mapping for creation of a shared on-line 3-D digital data base



**Mapping with laser and infrared spectrometer
for remote determination of rock types and structures**

Requirements

Locally-available expertise and support facilities

Dedicated space priority- separated from physics experiments

Upper level (North) 7 and 9 Ledge (1400-2300 Levels)

Good accessibility: Access by existing rail with locomotive and man cars

9 by 9 foot and 11 by 11 foot tunnel cross sections

Access from Ross Shaft

Good exposure of walls without much ground support

Power and ventilation